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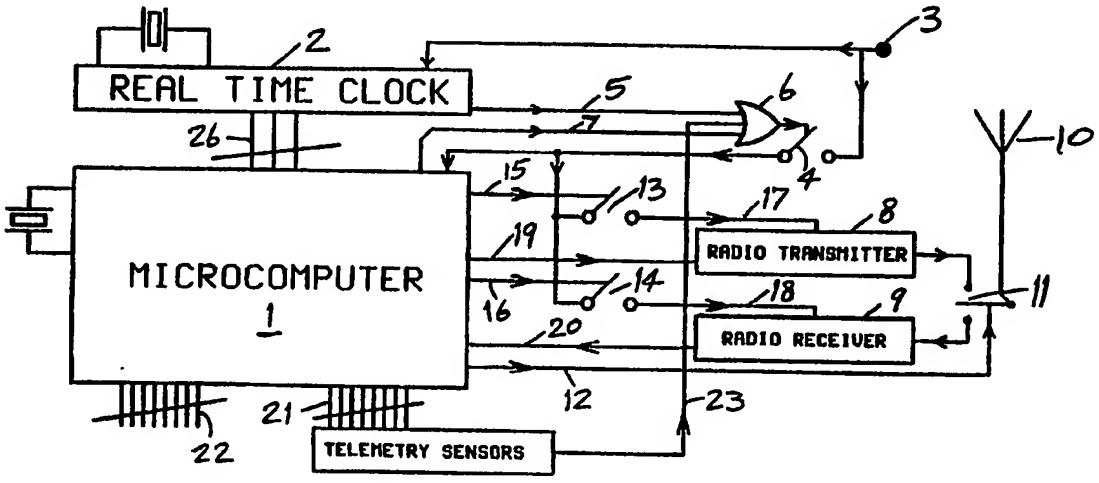
(54) **Synchronisation of a radio telemetry system**

(57) A control telemetry device transmits a periodic synchronisation signal to remove telemetry devices to establish synchronisation. The time period between successive synchronisation transmissions is divided into a series of message specific time slots eg. for remote stations to transmit data or alarm signals to the control device thus avoiding transmission clashes caused by simultaneous transmission of data between the remote devices and the control device. Each device comprises a microcomputer 1, a clock 2, and a radio transmitter 8 and a receiver 9 each connectable to an antenna 10 via a switch 11 controlled by the microcomputer 1. The microcomputer of a remote device receives data from telemetry sensors via data-in lines 21 and sends signals to another device, such as an alarm, via data-out lines 22.

The device may save power by the clock 'waking up' the microcomputer only for the duration of the synchronisation signal and for transmissions.

Fig 1.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

Fig 1.

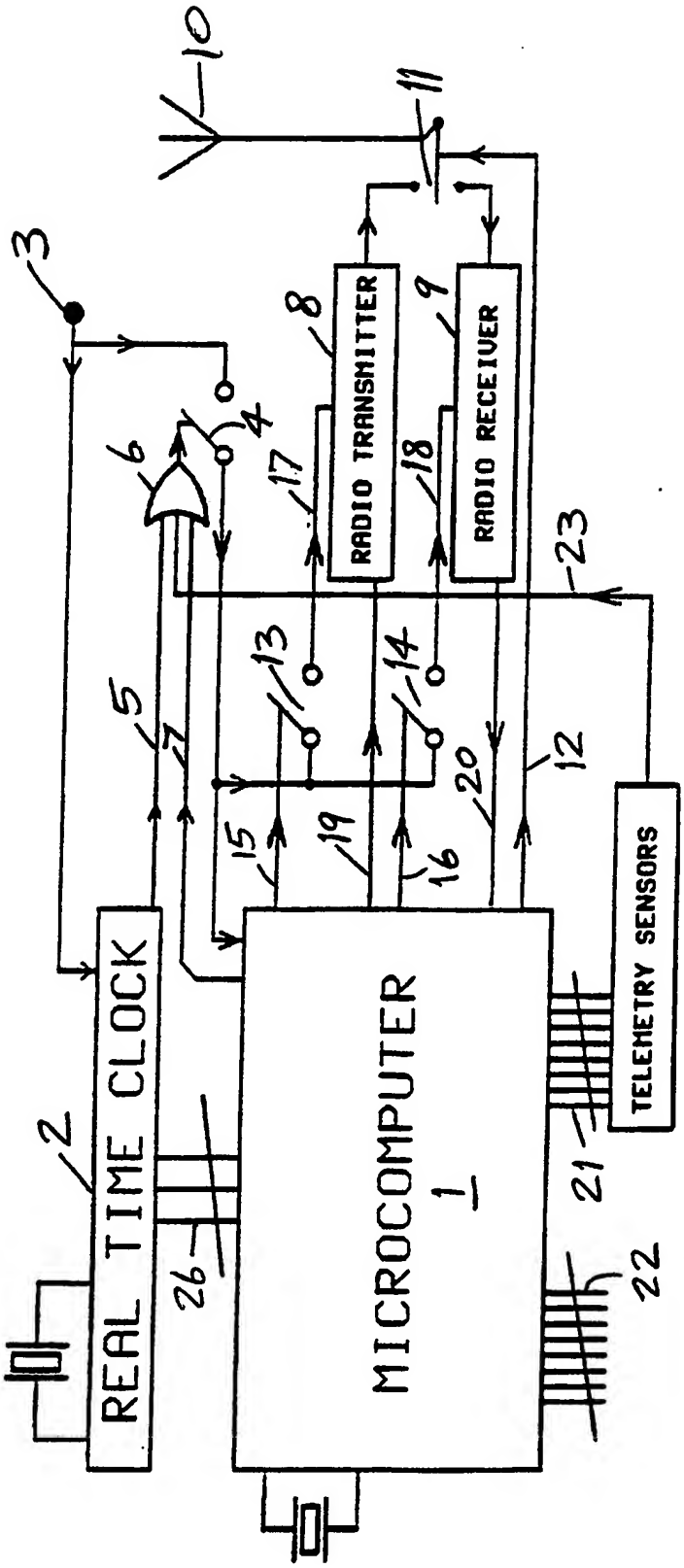
10
11
3
8
9
RADIO TRANSMITTER
RADIO RECEIVER
4
6
17
18
23
13
14
5
7
12
20
15
19
16
REAL TIME CLOCK
MICROCOMPUTER
1
TELEMETRY SENSORS
2
26
21
22

Fig 2.

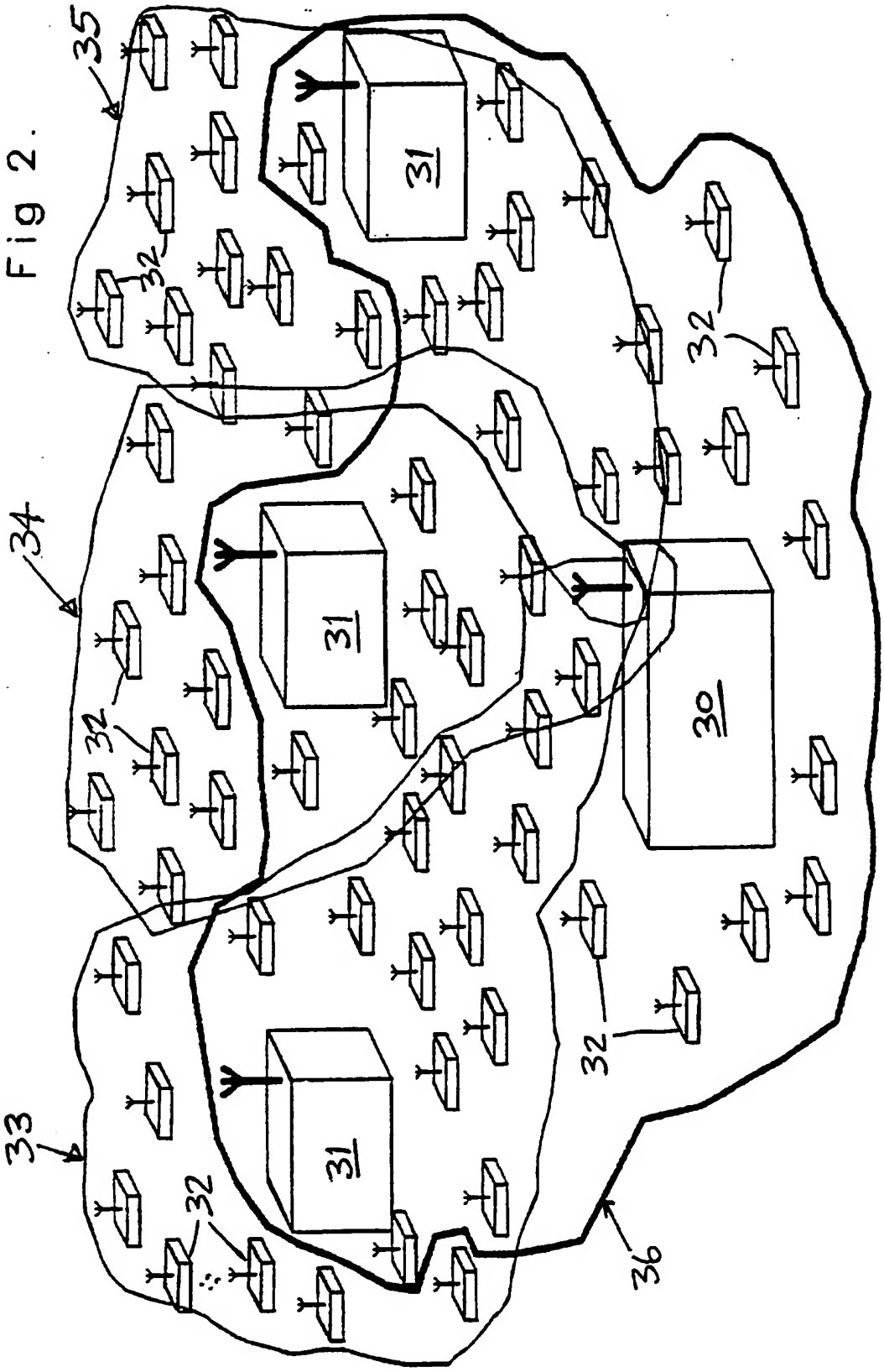

Fig 3.

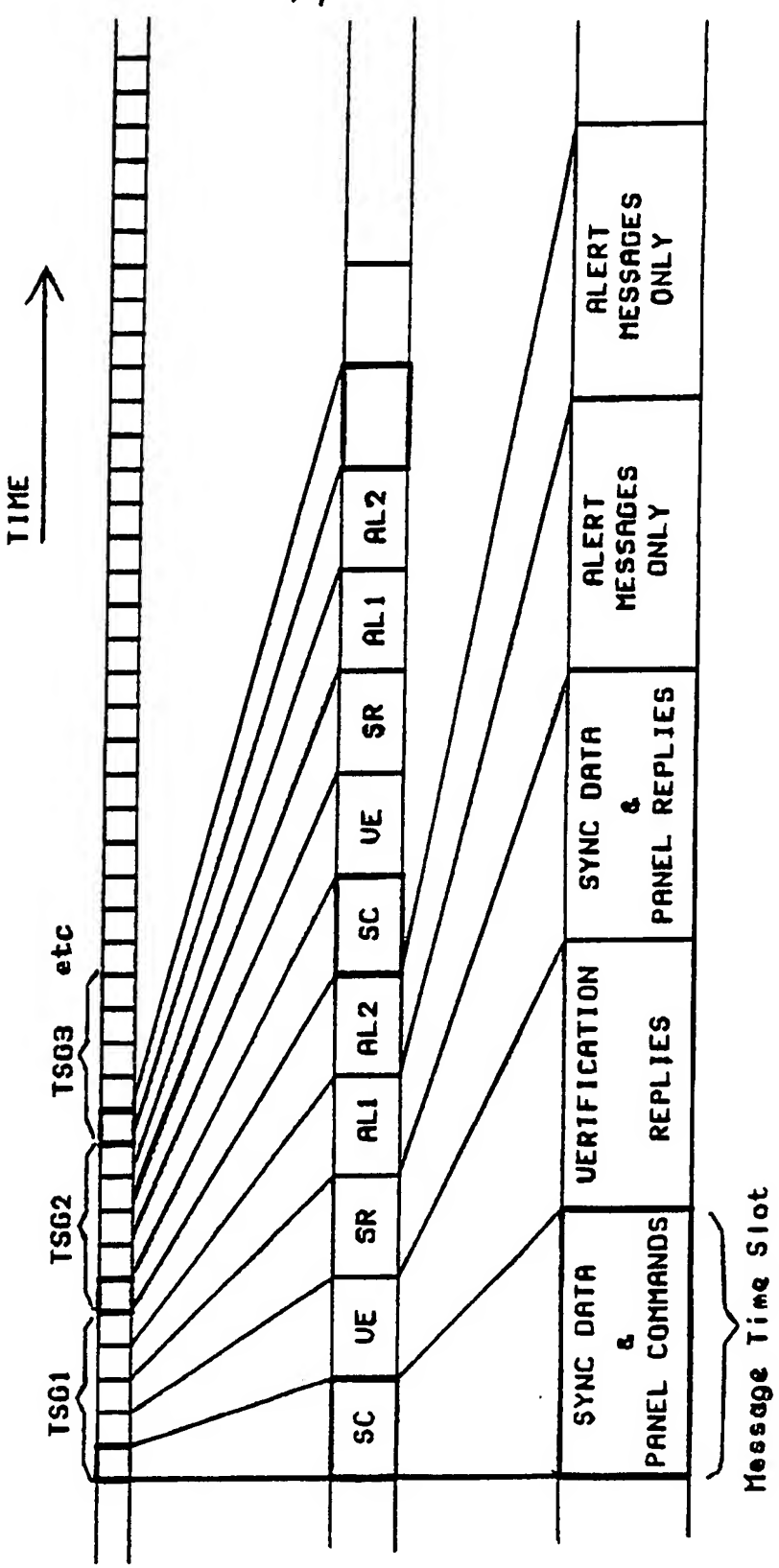
TIME
TSG1
TSG2
TSG3
etc
SC
UE
SR
AL1
AL2
SC
UE
SR
AL1
AL2
SYNC DATA & PANEL COMMANDS
VERIFICATION REPLIES
SYNC DATA & PANEL REPLIES
ALERT MESSAGES ONLY
ALERT MESSAGES ONLY
Message Time Slot

Fig4.

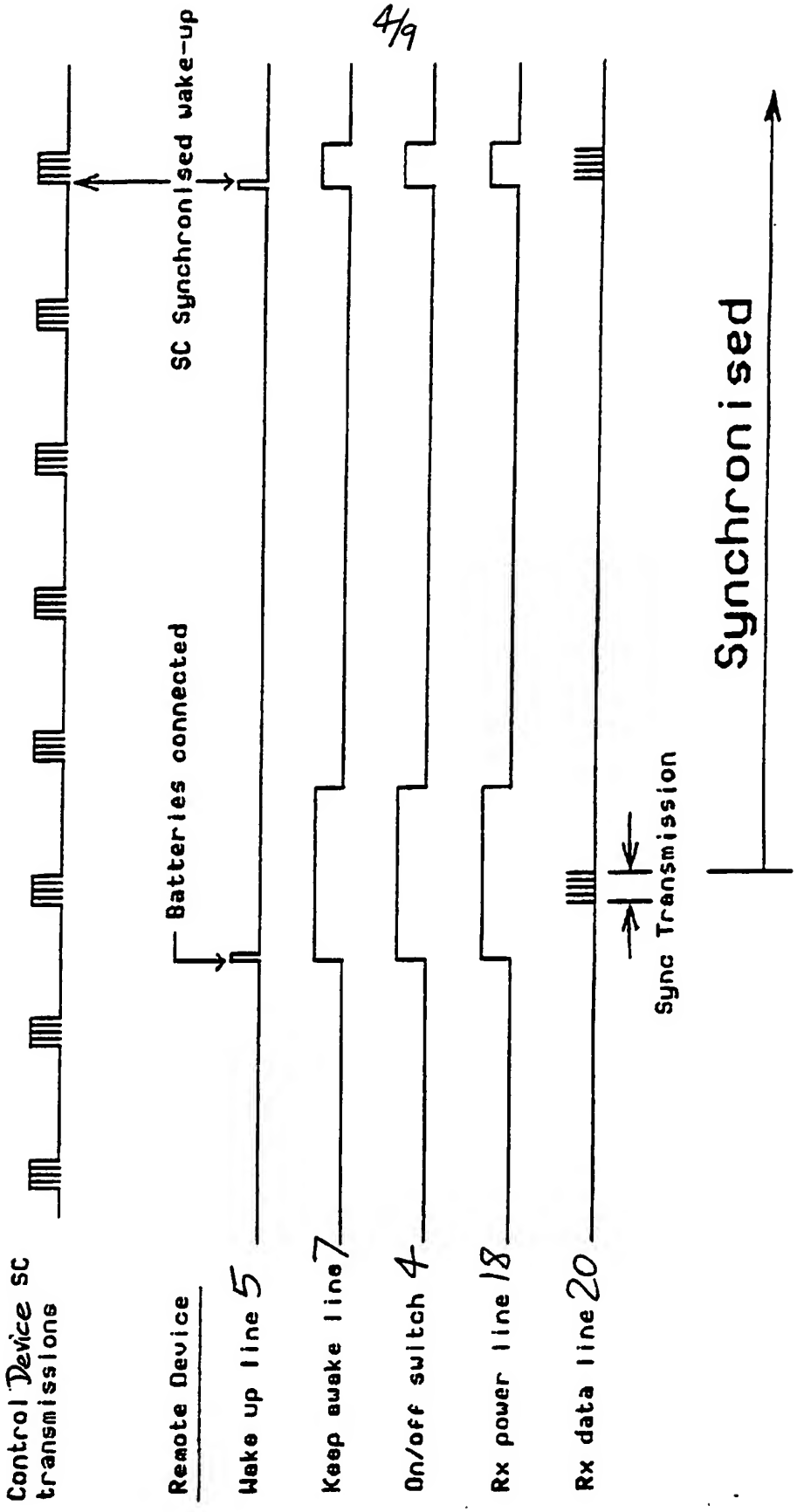
Control Device SC transmissions
SC Synchronised wake-up
Batteries connected
Remote Device
Wake up line 5
Keep awake line 7
On/off switch 4
Rx power line 18
Rx data line 20
Sync Transmission
Synchronised

Fig 5.

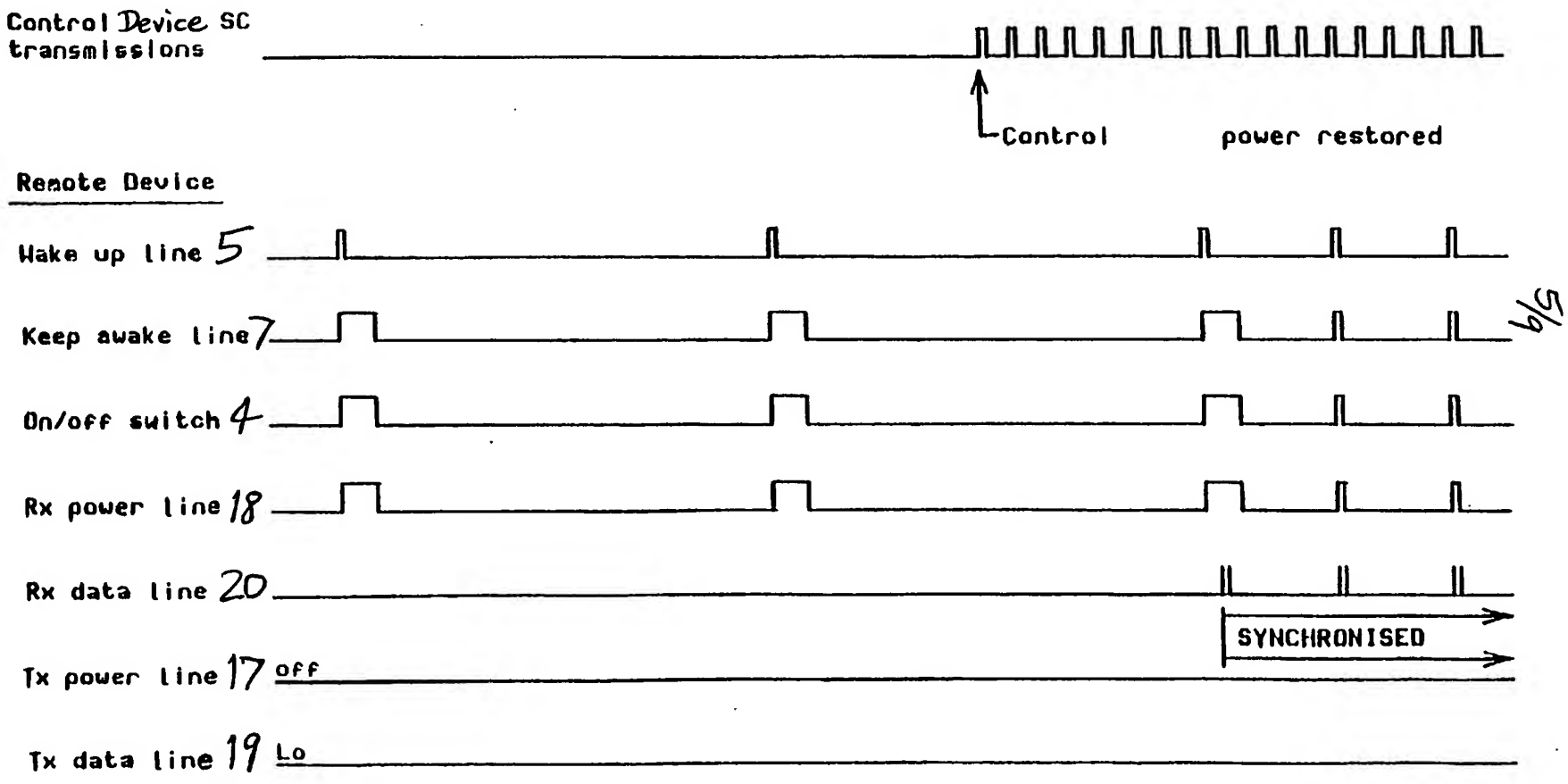

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Fig 6.

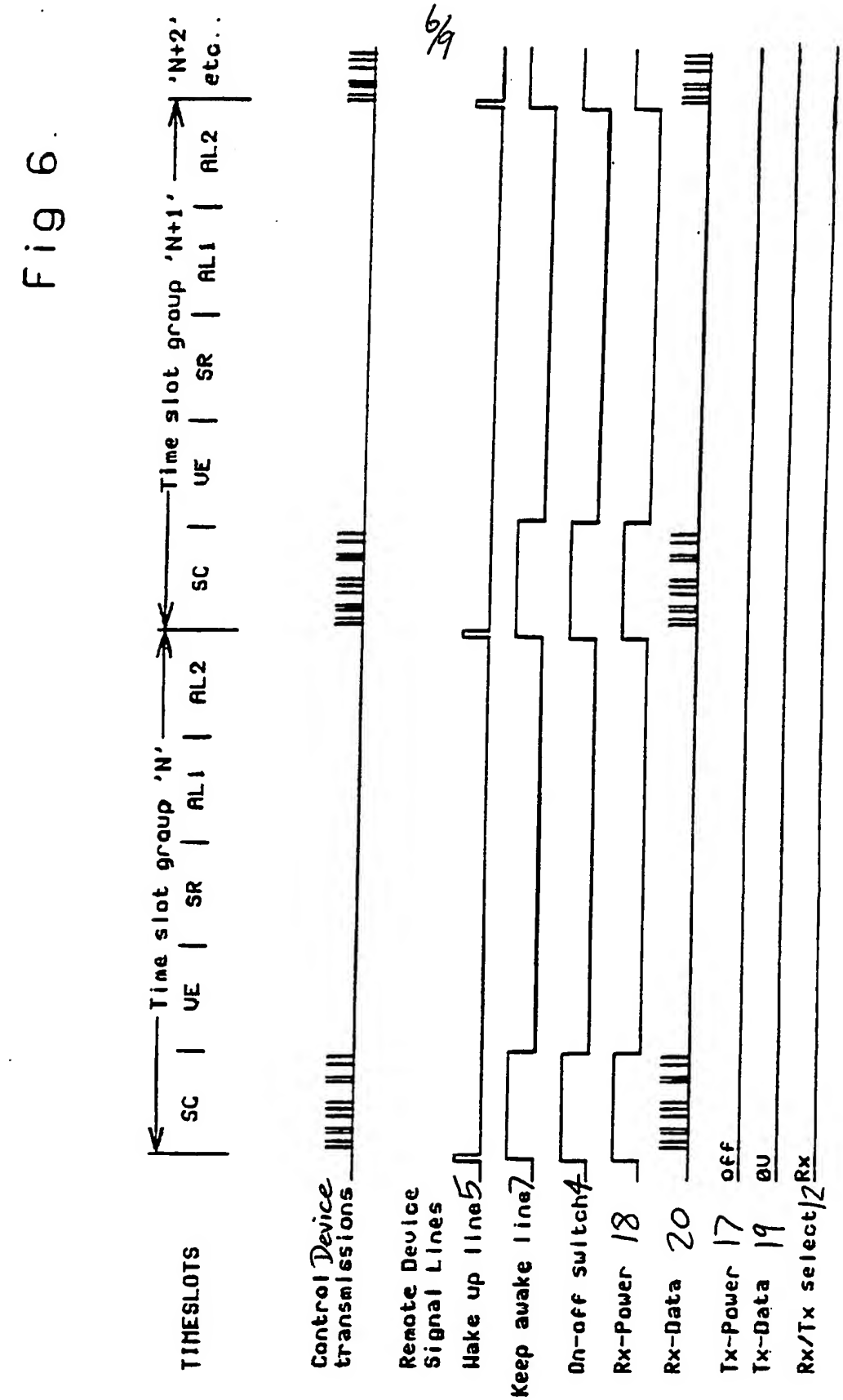

TIMESLOTS
Time slot group 'N'
SC | UE | SR | AL1 | AL2
Time slot group 'N+1'
SC | UE | SR | AL1 | AL2
'N+2' etc..
Control Device transmissions
Remote Device Signal Lines
Wake up line 5
Keep awake line 7
On-off switch 4
Rx-Power 18
Rx-Data 20
Tx-Power 17 off
Tx-Data 19 ou
Rx/Tx select 12 Rx
6/9

Fig 7.

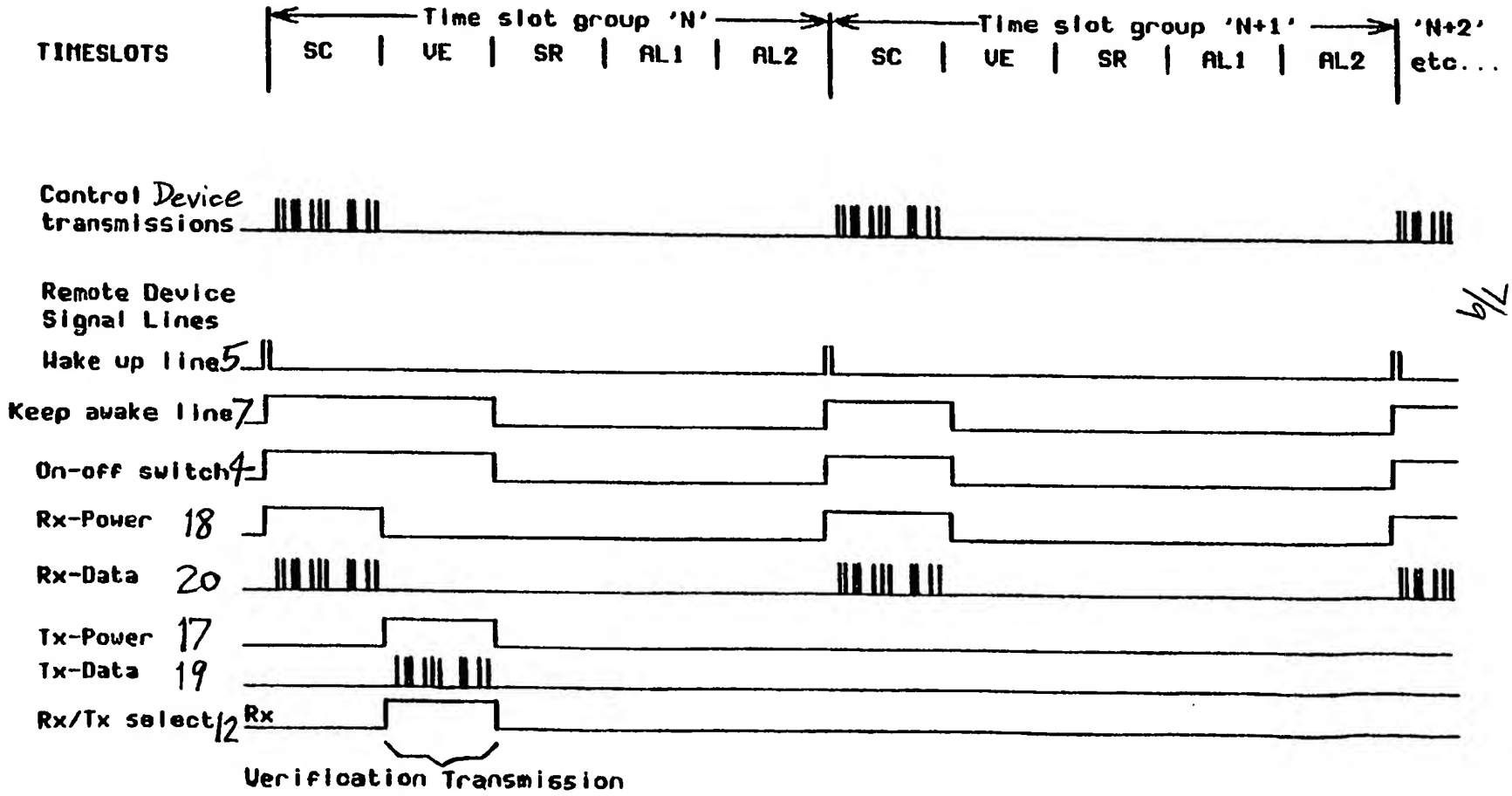


Fig 8.

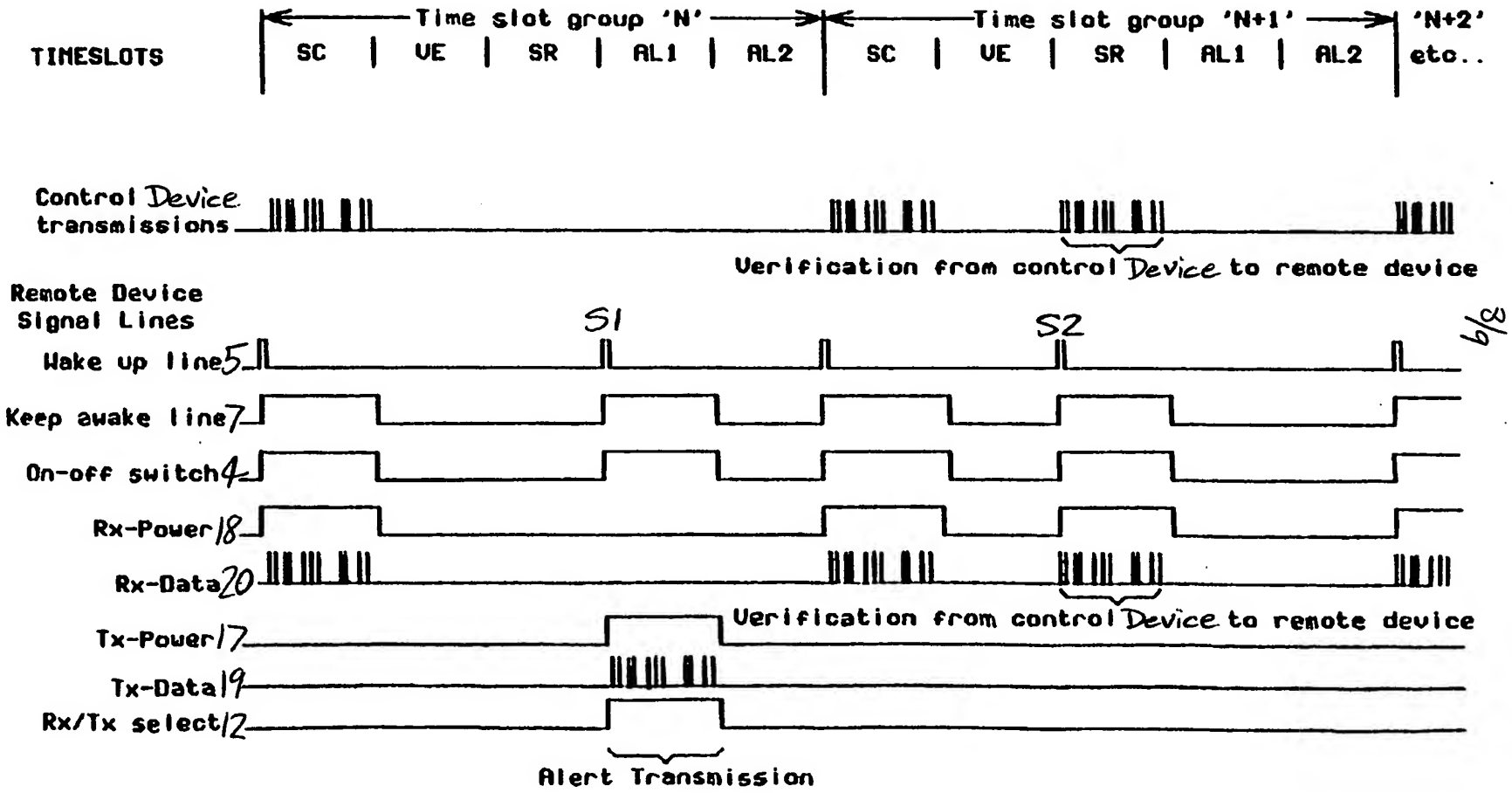
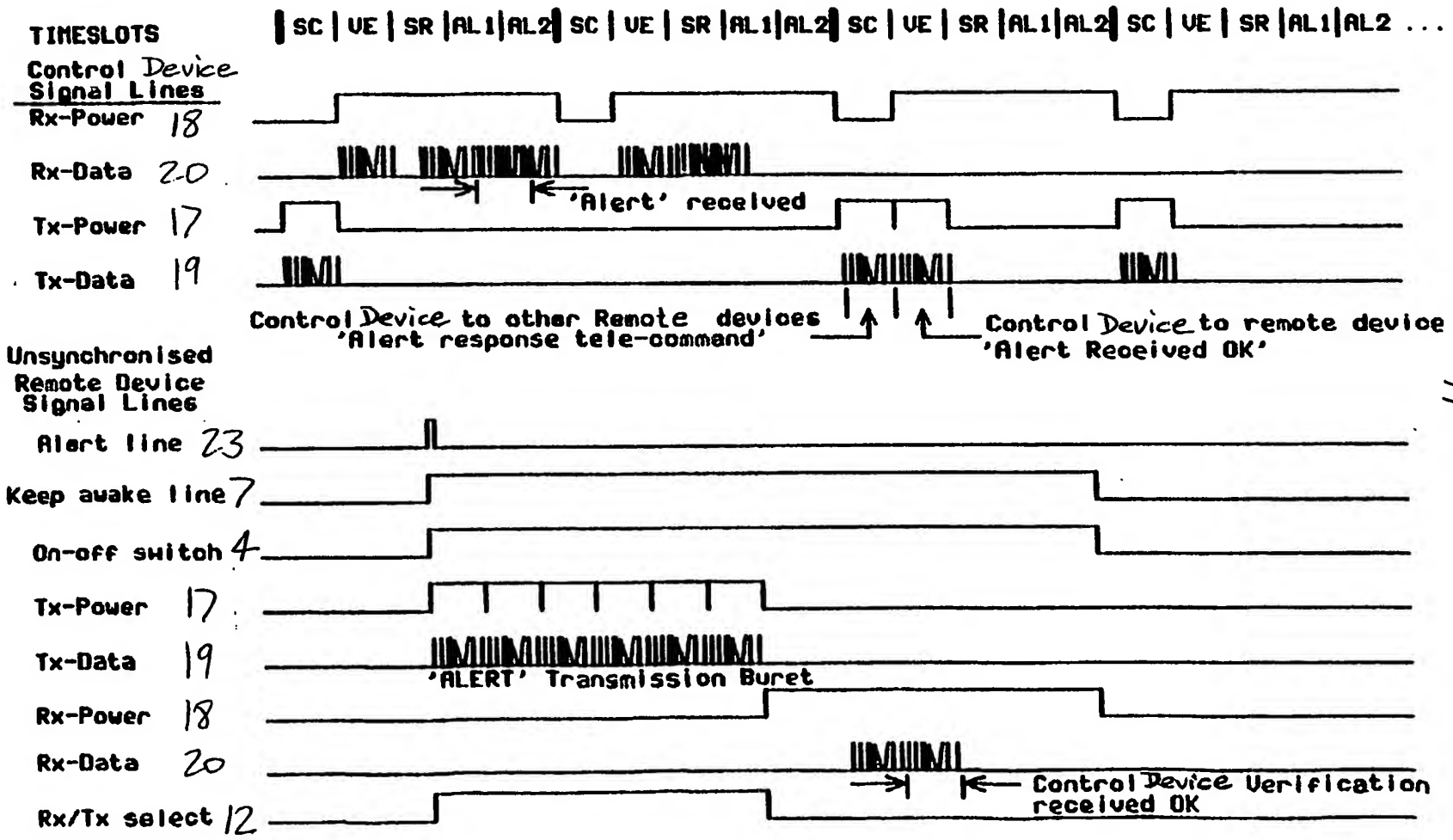


Fig 9.



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RADIO TELEMETRY SYSTEM AND DEVICE

This invention relates to a radio telemetry system and radio telemetry devices incorporated in the system, and more particularly to such telemetry systems comprising a number of low powered devices operating on the same frequency and within the same reception zone or footprint.

Radio transmission has been used for some years by for example the gas, water, and electricity companies for remote monitoring of voltage, water level, and pressure at their outstations throughout the UK. The radio channels available for such telemetry are allocated by the Department of Trade and Industry (DTI) and are closely controlled and licensed. These are used throughout the country at distant fixed sites. For a given location, the licensing authorities ensure that only one system is operating on any particular frequency at any one time, and clashes from other radio-band users should be negligible, and for the most part, determined by the selectivity of the radio receiver.

Such is not the case for users of the frequency bands allocated to what are known as "low power devices". These cover many applications ranging from short range in building alarms and industrial/commercial telemetry and telecommand through to short range alarms for the elderly and infirm.

Users of these low power devices are allowed to transmit without a license and at any location (provided that certain conditions are met), and it is inevitable that clashes between the transmissions from large numbers of devices operating on the same frequency will cause a failure in the communication of what information which may be crucial to the safety or security of persons or property.

A typical use of such low power devices is in complex fire detection systems utilising a large number of battery powered smoke detectors which automatically trans-

mit a verification signal back to a main fire control device at regular time intervals using a single radio channel. If a fire is detected, the integrity of the system relies on the successful transmission of alert or command data from a remote telemetry device to its respective alarm control device.

Many low power telemetry systems, especially those used for safety critical applications, produce periodic transmissions as a means of verifying the existence of a clear communications channel between each remote device and the main control device. These so called "verification transmissions" are of lower priority than the safety critical telemetry alert and command transmissions. It is essential that these safety critical transmissions do not clash with the verification transmissions as such transmission clashes lead to loss of data and poor communications integrity, which is unacceptable in many applications.

One technique currently employed to reduce the statistical likelihood of a transmission clash is to have the signal retransmitted periodically by the initiating device until it is verified by being echoed back by the receiving device. This technique is only viable where there are a relatively small number of transmitters sending short transmissions, having a duration of a fraction of a second, with randomly varied retransmission intervals, in which case the extra transmissions do not significantly affect the channel traffic. However, in cases where this technique is deemed necessary, the likelihood of simultaneous transmission is often already considerable, and the large numbers of additional transmissions generated, rapidly clutter the single available radio channel until no further communication is possible. In these cases radio telemetry is unsuitable and expensive wiring installations are necessary.

An object of the present invention is to provide a radio telemetry system and device therefor which ensure

that, even in a system comprising a large number of devices operating on the same frequency and within the same reception zone or footprint, there are essentially no transmission clashes caused by simultaneous transmission of data between remote telemetry devices and one or more control telemetry devices.

According to one aspect, the invention consists in a radio telemetry system comprising a first radio telemetry device arranged to transmit synchronisation signals and at least one remote radio telemetry device arranged to receive the synchronisation signals and to be synchronised with said first radio telemetry device.

Preferably, the system comprises a plurality of remote telemetry devices and one or more control telemetry devices, at least one of the control devices being arranged to transmit synchronisation signals with respect to which the remote telemetry devices are adapted to achieve synchronisation. The devices of the system are preferably arranged, when synchronised, to transmit and receive data only during discrete time slots which are periodic and message specific.

In one specific embodiment, the system comprises a control telemetry device and a plurality of remote telemetry devices located within a reception zone of said control device, said control device being arranged to transmit periodic synchronisation signals so that all of the telemetry devices within the reception zone are synchronised with respect to each other.

In another embodiment, the system comprises a main control telemetry device and one or more auxiliary control telemetry devices located within the reception zone of said main control device, and one or more further remote telemetry devices located within the reception zone of the or an auxiliary control device but outside of the reception zone of said main control device, the or each auxiliary control device being arranged to receive synchronisation signals

from said main control device and to transmit synchronisation signals so as to synchronise the or each of said remote devices within the reception zone of said auxiliary control device.

The time period between each periodic synchronisation signal is preferably portioned into a predetermined number of time slots each designated by the devices as being specific to transmission and reception of predetermined data.

According to another aspect, the invention consists in a radio telemetry device for use in the telemetry system according to the first aspect of the invention, said device comprising a microcomputer, means controlled by said microcomputer for receiving and for transmitting radio signals, and clock means associated with said microcomputer for synchronising said device with respect to other telemetry devices located within said system.

The microcomputer may have data input and output means for receiving data from remote sensors and for sending data to other remote devices, such as an alarm.

The microcomputer may be arranged to calculate the chronological position of the time slots, during which specific information is to be transmitted or received, in relation to the synchronisation signals.

The clock means is preferably arranged to set the microcomputer on reception of one of said synchronisation signals from another telemetry device, and to transmit a clock pulse or "wake-up" signal to the microcomputer just prior to receipt of another one of said synchronisation signals after a predetermined number of time slots.

A power supply, for example a battery, may be connected to the clock means, but only connectable to the other components of the device by switching means controlled by the clock means and the microcomputer. The switching means may also respond to signals from a remote sensor associated with said device to supply power to the

microcomputer whenever an alert signal is received by the device. In this way, the device can be powered from a battery for relatively long time periods.

The device may be arranged to transmit low priority or verification transmissions only when it is synchronised, whereas provision may be made for the transmission and reception of alert or safety critical data from unsynchronised devices.

By means of the present invention, multiple radio telemetry systems are possible which broadcast on the same frequency within the same, or overlapping, reception zones. For instance, neighbouring buildings may have large radio telemetry fire detection and alarm systems. Each system can be designed to have its own time slot synchronisation master device and all of the telemetry devices of the system are synchronised to a coordinated universal time, for example using an off-air clock receiver. The remote devices of the system may be allocated different response code numbers and extra time slots in the time slot group may be needed to prevent clashes between alert transmissions of adjacent systems. The use of an off-air clock receiver is a convenient method of providing an accurate, reliable and independent time signal which may be used in any such system.

The invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a block circuit diagram of a telemetry device according to one embodiment of the invention,

Figure 2 is a schematic diagram of a system in accordance with one embodiment of the invention including a plurality of remote telemetry devices, a main control telemetry device, and three auxiliary control telemetry devices, each constructed in accordance with the device shown in Figure 1, and depicts the respective reception footprints of the control devices,

Figure 3 is a schematic representation of one example of a discrete time slot arrangement,

Figure 4 shows the signal characteristics of a remote device during synchronisation thereof with respect to a synchronisation signal from a control device,

Figure 5 shows the signal characteristics of a remote device during re-synchronisation thereof following a power failure of the control device,

Figure 6 shows a handshaking sequence between a control device and a remote device for ongoing device synchronisation,

Figure 7 shows the handshaking sequence including a remote device verification transmission,

Figure 8 shows the handshaking sequence for a synchronised alert transmission from a remote device, and

Figure 9 shows a handshaking sequence between a control device and an unsynchronised remote device with provision of an alert signal.

Referring first to Figure 1, a radio telemetry device according to one embodiment of the invention has a microcomputer 1 which controls a real time clock 2 via control lines 26. The clock 2 is permanently connected to a power supply, via power input 3, and the microcomputer 1 is connectable to the power supply 3 via an on-off switch 4. The clock 2 supplies a very short "wake-up" signal to switch 4 via "wake-up" line 5 and OR gate circuit 6 to momentarily switch on the microcomputer 1. As the "wake up" signal is very short, the microcomputer 1 supplies a "keep awake" signal to switch 4 via "keep awake" line 7 and OR gate circuit 6. Thus the microcomputer 1 determines the length of time for which the device receives power. The telemetry device also comprises a radio transmitter 8 and a radio receiver 9, which are connectable to an antenna 10 via a switch 11 controlled by the microcomputer 1 via "transmitter/receiver select" line 12. The microcomputer 1 also controls switches 13 and 14

by means of transmitter and receiver control lines 15 and 16 respectively, thereby supplying power to the transmitter and receiver via their respective power lines 17 and 18 and switches 13 and 14.

The microcomputer transmits signals to a control telemetry device of same construction as the device of Figure 1, as a result of data received from telemetry sensors connected to the "data in" lines 21, via transmitter data line 19, and sends signals to an alarm or other functional device (not shown) connected to the "data out" lines 22 as a result of command signals from the control device received via "receiver data" line 20.

In Figure 2, there is shown a main control telemetry device 30, three auxiliary telemetry control devices 31, and a plurality of remote telemetry devices 32, which together form a radio telemetry system in accordance with an embodiment of the invention. Each of the telemetry devices 30,31,32 is constructed in accordance with the device shown in Figure 1, and is located within at least one of a main reception zone or footprint 36 containing the main control device and three auxiliary reception zones or footprints 33,34 and 35 each containing an auxiliary control device 31. Additionally, all of the auxiliary control devices 31 are located within the main reception footprint 36.

The remote devices 32 receive signals from telemetry sensors, for example smoke detectors (not shown), via "data in" lines 21, shown in Figure 1, and relay alert signals to the main control device 30 or an auxiliary control device 31 within the same footprint. The remote devices 32 may also activate associated devices, for example fire extinguishers (also not shown), via the "data out" lines 22, as a result of a command from the main or an auxiliary control device 30 or 31 also within the same footprint.

The sequence of synchronisation of the system in Figure 2 is as follows. The main control device 30 is

designated as the time slot synchronisation master and transmits periodic synchronisation signals in order to initiate synchronisation of all of the auxiliary control devices 31 and remote telemetry devices 32 of the system. All telemetry devices which receive these signals directly, i.e. all those devices within the main reception footprint, reset their clocks to transmit the "wake up" signal shortly before one of the synchronisation signals is to be received. This may be the next synchronisation signal or after a specified number of such signals. As all three auxiliary control devices 31 lie within the main footprint 36, their clocks are also set in the same manner. Once sufficient time has passed for all the devices within the reception footprint of the main control device 30 to have been synchronised, the control device 30 stops transmitting and the synchronised auxiliary control devices 31 repeat the synchronisation signals one at a time in a predetermined order so as to synchronise all of the remote devices 32 within the auxiliary footprints 33,34,35 which are not also within the main footprint 36.

Figure 3 shows a schematic diagram of an example of utilisation of discrete periodic time slots. The time slots may be arranged into time slot groups TSG1, TSG2, TSG3, etc, with each group comprising five time slots. In the first time slot of each group, the synchronisation signal SC is transmitted, so that if for example each time slot was of 200ms duration, the periodic synchronisation signals would occur at 1 second time intervals. The intervening time slots are then designated so as to be message specific. For example, as shown in figure 1, each time slot group could comprise the following time slots:

Sync data and control commands SC, verification replies VE, sync data and control replies SR, and two slots for alert messages AL1, AL2. This sequence repeats itself periodically as shown.

The time slot group in Figure 3 has two time slots

assigned for alert messages from the remote telemetry devices due to the safety critical nature of this information and, also, to permit reception of alert transmissions from unsynchronised devices as described below. Verification replies VE may not be sent from unsynchronised devices to avoid transmission clashes.

Referring to Figures 1 and 4, to enable each remote telemetry device to operate for long periods from a battery, only the clock 2 is continuously powered. The clock behaves like any normal alarm clock in that it sends a "wake up" signal via line 5 to the ON/OFF switch 4 via OR gate circuit 6 to power up the microcomputer 1. The microcomputer immediately switches on receiver 9 via line 18 and, as shown in Fig. 4, sends a "keep awake" signal via line 7 to the ON/OFF switch 4. Figure 4 shows the synchronisation sequence immediately after connecting power to a remote device. The microcomputer 1 keeps the receiver 9 operational for a predetermined period which is normally of at least one time slot. If a synchronisation signal is received by the device, the microcomputer calculates the length of the time slot group and presets the "wake up" register of the clock 2 so as to transmit the "wake up" signal just prior to the next synchronisation signal time slot, or after a predetermined number of time slot groups. In Figure 4, the clock has been set to switch on once every fifth time slot group in order to conserve power. Provided that no alert transmissions are instigated by a telemetry sensor or verification replies VE are requested in the synchronisation command signal, then the microcomputer 1 is only powered, once synchronised, for slightly longer then one time slot.

In Figure 5 a situation is shown where the clock 2 of any telemetry device is no longer synchronised with the time slot sequence due to, for example, a power failure. If, as in Fig. 2, the system has one or more auxiliary control devices, then the microcomputer 1 does not know

where the synchronisation signal is in the time domain and it would consume too much battery power to have the receiver 9 and microcomputer 1 powered up indefinitely. Consequently, the microcomputer 1 searches for the periodic synchronisation signal SC by waking up periodically, for example, once every (N_{min} x one time slot group -1) seconds, for (one time slot group + 1 time slot) seconds duration, where N_{min} is the minimum number of synchronisation transmissions made by the respective control device during the ongoing verification/synchronisation process. This process is especially important in large systems having a number of auxiliary control devices, where only one of the control devices will be transmitting the synchronisation signals at any one time or where a synchronisation signal is not transmitted every time slot group.

In Figure 6, the signal characteristics of the control and remote devices are shown during the on-going remote device synchronisation handshake sequence. These are shown in relation to the periodic time slot group N+1, N+2, etc.

In this case, referring to Figures 1 and 6, a remote telemetry device is synchronised with a control device which is transmitting a synchronisation signal at the beginning of every time slot group. The microcomputer 1 of the remote device has set the clock 2 to transmit a "wake-up" signal via line 5 just prior to the synchronisation command time slot SC of each time slot group. The "wake-up" signal is transmitted to the ON-OFF switch 4 causing the microcomputer to be powered. The microcomputer 1 sends a "keep awake" signal via line 7 to the ON-OFF switch 4 and a further signal to the receiver control switch 14 via line 16 to connect the radio receiver 9 to the power via line 18. The receiver - data line 20 shows the reception of the synchronisation/command signal which is transmitted to the microcomputer 1. The microcomputer 1 stores the time slot group information including the length

of each time slot, the number of time slots and the message purpose of each time slot. The synchronisation/command signal SC not only indicates the location of the time slot group in the time domain, but may also contain command data concerning verification replies, operation of functional devices, or any other system control commands, the amount of information transmitted being limited by the duration of each time slot. In Fig. 6, as no verification replies or device operations have been requested of this remote device, the microcomputer completes its housekeeping tasks, including turning off the receiver 9, and then powers down until the next "wake-up" signal is received from the clock 2.

In Figure 7, the signal characteristics of the control and remote devices are shown during the ongoing synchronisation/verification handshake sequence. Here, the control device synchronisation transmission contains a request for a verification reply. After the receiver 9 is switched off as above, the microcomputer switches on the transmitter 8 by closing switch 13, sends a signal to the switch 11 to connect the transmitter 8 to antenna 10, and sends a verification transmission signal to the transmitter via transmitter data line 19. The verification transmission falls precisely within the verification reply VE time slot, thereby avoiding a transmission clash with other signals. Once again the microcomputer powers down after turning off the transmitter by opening switch 13 and disconnecting it from the antenna 10 at switch 11.

If data from a telemetry device instigates the transmission of an alert signal then, for a synchronised device, the handshake sequence will be that shown in Figure 8.

When a telemetry sensor is activated, for example by the detection of smoke by a smoke detector, the sensor device transmits a signal to the ON-OFF switch 4 via alert line 23, so that the microcomputer 1 is powered and may

receive alert data via "data-in" lines 21. A synchronised remote device will only transmit alert signals during the designated time slots and when alert data is received the microcomputer 1 will set the clock 2 to transmit an extra "wake-up" signal S1, via line 5, during the next time slot group, i.e. time slot group 'N' in Figure 8, just prior to the first alert time slot AL1. Once powered, the microcomputer transmits a "keep-awake" signal via line 7 to the ON-OFF switch 4, and further signals to the transmitter/receiver select switch 11 via line 12 and the transmitter switch 13 to connect transmitter power line 17. The alert data stored by the microcomputer is then sent to the transmitter 8 via "data-out" line 13, so as to provide the alert transmission within the alert time slot AL1, the microcomputer turns off the transmitter 8 and sets the clock 2 to transmit another extra "wake-up" signal S2 in the next time slot group (N+1), just prior to the system reply time slot SR, in order to receive a verification transmission or reply command from the control device. The microcomputer 1 then powers down until the start of the next time slot group (N+2). In the time slot group (N+1), the synchronisation signal SC is received as usual and the microcomputer 1 is also powered up to receive the systems reply SR. The systems reply transmission SR may contain command data to activate a functional device attached to the microcomputer "data-out" lines 22.

Although verification reply transmissions are not permitted by unsynchronised devices, since verifications are only transmitted when requested by a control device and an unsynchronised device receives no data from a control device, it is still essential that alert transmissions can be made and received successfully by any device and at any time. In Figure 9, the signal characteristics are shown for the control and unsynchronised remote devices in the event of an alert transmission.

An alert transmission will typically contain a

digitally encoded analogue reading from a sensor, such as a thermometer. It may also contain the identification code of the remote device and an indication as to whether or not the device is synchronised.

In Figure 9 the transmission of a synchronisation signal is shown which is not received by the unsynchronised remote device. The remote device will, however, be attempting to re-synchronise by "waking up" periodically as shown in Figure 5.

If the sensors of the remote device are activated, an alert "wake-up" signal is transmitted via line 23 to ON-OFF switch 4 as for a synchronised device. An unsynchronised device cannot simply receive the sensor data and transmit an alert signal in the next alert time slot, so the microcomputer transmits a "keep awake" signal via line 7, turns on the transmitter 8 via line 17, and transmits a continuous alert transmission for at least one time slot group + 1 time slot, i.e. in this case, at least six time slots duration. The use of a time slot group having two time slots designated specifically for alert signals AL1 and AL2 ensures reliable reception of the alert transmission, as shown by the control device receiver data line 20. The control device transmission power and data lines and the remote device receiver data line 20 also show the transmission and reception of a control device verification signal VE.

One of the key features of the provision of synchronised command signals is that, once the remote devices are synchronised, they need only be powered up just prior to a synchronisation signal to receive telecommand data. The microcomputers of the remote devices can therefore be powered down for the majority of the time. Typically, a clock chip might consume only 1/1000th of the power consumed by the microcomputer. Thus, battery powered remote devices having constantly powered up clocks may have battery lives of years instead of hours. A radio telemetry

system is therefore viable utilising the present invention, thereby obviating the need to connect remote devices by wiring of any sort to the control device, facilitating easy and cost effective installation of the system within any building.

The period of the synchronisation signal and the corresponding "wake-up" signal of the remote devices could be of any length but, in practice, will be determined by the required response time for the system. In safety critical situations, such as fire detection systems, a legal response time may apply. Thus the synchronisation and "wake-up" signals will have periods sufficiently short that the overall system response time will be within the required range.

Although various embodiments of the invention have been described, it will be understood that other modifications may be made without departing from the scope of the invention. For example, there may be any number of remote telemetry devices and control telemetry devices and the time slot group may be partitioned into any number of time slots. Furthermore, any appropriate information may be conveyed by the system and the functions of the telemetry devices of the system can be varied for any particular application.

CLAIMS

1. A radio telemetry system comprising a first radio telemetry device arranged to transmit synchronisation signals and at least one remote radio telemetry device arranged to receive the synchronisation signals and thereby to be synchronised with said first radio telemetry device.

2. A radio telemetry system as claimed in claim 1, comprising a plurality of remote telemetry devices and one or more control telemetry devices, at least one of the control devices being arranged to transmit synchronisation signals with respect to which the remote telemetry devices are adapted to achieve synchronisation.

3. A radio telemetry system as claimed in claim 1 or 2, wherein the devices are arranged, when synchronised, to transmit and receive data only during discrete time slots which are periodic and message specific.

4. A radio telemetry system as claimed in claim 1, 2 or 3, comprising a control telemetry device and a plurality of remote telemetry devices located within a reception zone of said control device, said control device being arranged to transmit periodic synchronisation signals so that all of the telemetry devices within the reception zone are synchronised with respect to each other.

5. A radio telemetry system as claimed in any preceding claim, comprising a main control telemetry device and one or more auxiliary control telemetry devices located within a reception zone of said main control device, and one or more further remote telemetry devices located within the reception zone of the or an auxiliary control device but outside of the reception zone of said main control device, the or each auxiliary control device being arranged

to receive periodic synchronisation signals from said main control device and to transmit synchronisation signals so as to synchronise the or each of said remote devices within the reception zone of said auxiliary control device.

6. A radio telemetry system as claimed in claim 5, wherein the time period between successive periodic synchronisation signals is portioned into a predetermined number of time slots each designated by the devices as being specific to transmission and reception of predetermined data.

7. A radio telemetry device for use in a telemetry system according to any preceding claim, said device comprising a microcomputer, means controlled by said microcomputer for receiving and for transmitting radio signals, and clock means associated with said microcomputer for synchronising said device with respect to one or more other telemetry devices located within said system.

8. A radio telemetry device as claimed in claim 7, wherein the microcomputer has data input and output means for receiving data from remote sensors and for transmitting data to one or more of said other devices.

9. A radio telemetry device as claimed in claim 8, wherein the device is arranged to receive and transmit periodic synchronisation signals, the time period between successive signals being portioned into a predetermined number of time slots, and the microcomputer is arranged to calculate the chronological position of the time slots, during which specific information is to be transmitted or received, in relation to the synchronisation signals.

10. A radio telemetry device as claimed in claim 9, wherein the clock means is arranged to set the microcomput-

er on reception of one of said synchronisation signals from another telemetry device, and to transmit a clock pulse or "wake-up" signal to the microcomputer just prior to receipt of another one of said synchronisation signals after a predetermined number of said time slots.

11. A radio telemetry device as claimed in any one of claims 7 to 10, including a power supply connected to the clock means, said power supply being only connectable to other components of the device by switching means controlled by the clock means and the microcomputer.

12. A radio telemetry device as claimed in claim 11, wherein said switching means also responds to signals from a remote sensor associated with said device to supply power to the microcomputer whenever an alert signal is received by the device.

13. A radio telemetry device as herein described with reference to figures 1 and 3-9 of the accompanying drawings.

14. A radio telemetry system as herein described with reference to figures 2 to 9 of the accompanying drawings.

P··ents Act 1977 L...miner's report to the Comptroller under Section 17 (The Search report) -18-	Application number GB 9219919.9
Relevant Technical Fields (i) UK Cl (Ed.L) H4L (LDA, LDSF, LDSX, LDRR); H4M (MTP2); G4H (HNHE, HNNA, HNEG) (ii) Int Cl (Ed.5) G08B 25/00, 25/10; G08C 15/06, 17/00; H04J 3/06; H04L 7/00; H04Q 9/00, 9/04	Search Examiner MR JOHN CAGE Date of completion of Search 29 NOVEMBER 93
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE DATABASE: WPI	Documents considered relevant following a search in respect of Claims :- 1-14

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Category	Identity of document and relevant passages		Relevant to claim(s)
X,E	GB 2266031 A	(MATSUSHITA) See page 20 line 2 - page 22 line 10 and Figure 4	1-4
X	GB 2192516 A	(THEIMEG) See Figures 2, 5 and page 2 line 110 - page 3 line 26	1-4, 7, 8, 9
X	US 4887266	(NEVE ET AL) See Figures 1, 7 and column 7 lines 43-46 column 4 lines 6-25	1-4, 7, 8
X	US 4470141	(TAKADA) See column 5 lines 17-27	1-4

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